

NMFS RESPONSE TO REVIEWS of smolt transportation research summary white paper:

April 2000

This document provides NMFS's responses to reviews of the draft white paper that summarizes research results related to smolt transportation. Formal reviews were provided by the Idaho Fish and Game Department, the Oregon Department of Fish and Wildlife, the Fish Passage Center, and the U.S. Fish and Wildlife Service. Comments or analyses from the Columbia River Inter-Tribal Fish Commission were included in some of the fisheries agency reviews. Comments were very similar or identical in all reviews. Many comments were highly speculative in nature or were derivatives of policy. These types of comments were not addressed. Based upon the reviews, NMFS has revised the white paper as appropriate.

All of the reviews and their cover letters appeared to misconstrue the purpose of the white paper. Specifically, the purpose was to summarize results of actual scientific studies designed to gather *hard* data and to outline key uncertainties. This information would then be used by affected federal agencies in the development of their Biological Assessments. Certainly, speculation abounds relative to the efficacy of smolt transportation and some concerns are surely legitimate. However, much recent speculation stems from computer-generated models or correlations that relied on *soft* data (assumption-laden information that was several layers removed from any actual measurements) or data with little power in numbers (recent adult returns of PIT-tagged fish) to reach conclusions. NMFS believes it is of utmost importance to recognize the tremendous variability inherent in virtually any parameter related to anadromous salmonids and their environment. Given this highly variable nature, valid conclusions regarding salmon are only possible via carefully designed research conducted *in situ* and over a sufficient period of time to capture at least most of the inherent variability.

Major agency comments and NMFS's responses to them follow:

The draft white paper fails to consider the smolt-to-adult survival rates (SAR) of transported and in-river fish...transport SARs have never been shown to be adequate for stock recovery....

Most comments of this type suggested that SARs of transported fish have never equalled the 2 to 6% level deemed necessary for stock recovery and therefore the technique is not useful as a recovery measure. We have added ranges of total estimated transport SARs to the text where appropriate. However, the studies were not designed to provide accurate or otherwise scientifically meaningful data in this area relative to the population at large. Smolts were not marked proportional to the outmigration distributions as they have been in recent years nor were they marked over the entire smolt migration periods. Recently, new data show that within-year spring/summer chinook salmon SARs can vary tremendously over short periods. Also, SAR data in older studies that used coded-wire tags and freeze brands were calculated from samples of the total adult returns (observed not total adult returns). Accurate estimates of adult trapping efficiencies for reliable expansions of observed to total SARs were never made. Finally, many of the earlier studies were conducted prior to the advent of major

improvements in smolt handling and marking techniques and during a long, well-documented period of low oceanic productivity for Pacific salmon populations of the western coast of the United States (Mantua et al. 1997, Peterman et al. 1998, Beamish et al. 1999, Hare et al. 1999).

It should be noted that recent PIT-tag information strongly suggests that 2 to 6% transport SARs may be documented soon. For wild spring/summer chinook salmon PIT tagged above Lower Granite Dam and then transported in 1997, the SAR currently stands at 1.6%, with 5-year-old fish yet to be recovered in spring/summer 2000. At a minimum, SARs for this group should approach or, more likely, exceed 3% when adult returns are complete. Jack returns for the same group transported in 1998 indicate that even higher SARs should be forthcoming when adult returns are complete for that smolt-migration year.

2) The concept of λD is crucial to evaluating the effectiveness of transportation...this review virtually ignores this essential component....

NMFS agrees with this comment and has added a section on the λD concept to the white paper. The concept is also listed in the Key Uncertainties section with references to the State, Tribal, and USFWS response (Bouwes et al., 4 October 1999) to the Draft Anadromous Fish Appendix and in Section 4.4.3.1 and Annex C of Appendix A--Anadromous Fish of the Draft Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement (USACE December 1999) to guide readers to detailed discussions of this topic.

3) More data are unlikely to perfect our understanding of λD ...the resolution of this uncertainty will rely on unprecedented improvements in survival rates....

NMFS disagrees with comments of this nature (again see Annex C of Appendix A in USACE [1999]). In the recent past, numbers of returning PIT-tagged adults on which current λD estimates were based have been few; hence, annual SAR point estimates were subject to high stochastic variation and low precision. Also, NMFS believes Bouwes et al. (1999) calculated λD incorrectly relative to previous PATH analyses. NMFS further believes that λD is likely less than 1.0 (i.e., there is a higher level of delayed mortality for transported fish relative to those that migrate inriver once both groups have passed Bonneville Dam). For example, during the relatively long period of inriver migration through the hydropower system, some fish are bound to die due to causes unrelated to the hydropower system itself (e.g., those heavily infected with BKD at the upper end of the reach). Although unrelated to passage through the hydropower system, this mortality will accumulate in the estimates of inriver mortality between the upper dams and below Bonneville Dam. Most fish that are bound to die but are transported will not die until after release below Bonneville Dam. This potential difference in mortality timing among fish that are destined to die regardless of migration path will eventually manifest itself in λD .

For Snake River spring/summer chinook salmon, SAR levels required to accurately quantify λD are not unprecedented, although they have been relatively rare over the last 3 decades. However, the 1995

through 1998 smolt migrations have been characterized by an increasing trend in SARs whether based on adult returns of PIT-tagged fish or smolt-to-jack return rates. For example, SARs of wild smolts tagged above Lower Granite Dam in 1997 are currently 1.6%, with 5-year-old fish yet to return. When adult returns are complete in 2000, the final SAR will likely be in the 2-6% range. Moreover, returns of PIT-tagged jacks that migrated as smolts in 1998 indicate an even higher SAR will likely be forthcoming for that year class. Since the four lower Snake River dams were completed in 1975, the count of spring/summer chinook salmon jacks over Lower Granite Dam in 1999 was second only to the count registered in 1976. Further, the jack return to Bonneville Dam to date (late April 2000) indicates that largest jack return in recorded history will occur, which will lead (if historic jack-to-adult return rates hold) to the largest total return of spring chinook salmon (since data were kept at Bonneville Dam beginning in 1938) to the Columbia River (most of which will have originated in hatcheries). Finally, it is disturbing to imagine a science where additional data would not reduce uncertainty and add knowledge.

4) Page 4, 3rd paragraph: **...there is quick mention of Aadjusting [T/Cs] for time of ocean entry®. There appears to be little justification for this adjustment...the methodology for this procedure has not been distributed within the region for technical review...**

NMFS concurs and has removed the statement regarding time of ocean entry adjustment for transported fish from the white paper.

5) Page 13, 3rd paragraph: **The disclaimer about estimates of straying is unnecessary and out of context.**

On the contrary, the statement by a noted expert in the field was provided, not as a disclaimer, but as a lead-in to this section to provide the reader with a short background and context on the subject.

6) **The effects of transportation on straying have not been adequately studied...transportation contributes to delay and straying in returning adults.**

The state of knowledge related to homing and straying of anadromous salmonids transported from Snake River dams is summarized in the white paper. It is clearly stated that while the levels of homing impairment, if any, appear to be minimal for transported relative to nontransported Snake River fish, the data are admittedly limited. Precise measurements of homing impairment specific to fish transported from Snake River dams simply are not available. The need for studies to accurately quantify the effects of smolt transportation from Snake River dams on homing impairment in returning adults was clearly stated under Key Uncertainties. These studies will be initiated when adult PIT-tag detection systems are in place at dams. For now, there simply are no data demonstrating conclusively that transportation of smolts from Snake River dams results in unacceptable levels of homing impairment.

7) Truck transportation is an economic issue...needs to raise concern over the continued use of truck transport.

The contentions regarding truck transport are similar to those for homing and straying. The number of head-to-head tests of barge vs. truck transport are few. Of the species tested, a small, but statistically significant difference that favored barging, was found for yearling chinook salmon during a single study on that species; no differences were found for five other studies on either steelhead or subyearling chinook salmon. More data are clearly needed to resolve the uncertainties relative to truck vs. barge transport. A statement to this effect was included under the Key Uncertainties section.

References

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